INSTRUCTION MANUAL
FOR THE
NATIONAL MODEL SW-54
RADIO RECEIVER

SECTION 1. INSTALLATION

1-1. INSTALLATION PROCEDURE

The SW-54 Receiver is designed to operate from a 105/130 volt, 50/60 cycle, A.C. source of supply or a 105/130 volt, D.C. source of supply. Normal power consumption is approximately 25 watts at 115 volts.

Installation of the SW-54 is accomplished as follows:

1. Uncoil the antenna attached to the terminal at the rear of the receiver and extend to its full length. If a longer or outside antenna is desired, connect an antenna as recommended in Section 1-2.

2. Connect a good external ground (radiator or water pipe) to the cabinet. A screw-type terminal is provided at the top center of the cabinet back to facilitate this connection. This connection, if used, serves two purposes:

   a. Achieves a considerable reduction in noise interference in certain localities.

   b. Eliminates the possibility of shock occurring if the operator makes bodily contact between the Receiver and ground.

3. Connect the power cable and plug to the proper source of supply i.e., 105/130 volts, 50/60 cycles, A.C. or 105/130 volts D.C. Proper polarity of the plug should be observed when connection is made to a power source although no damage to the Receiver will occur if the polarity is reversed. Reversed polarity will be evidenced as follows and is corrected by simply reversing the plug prongs in the power outlet.

   a. D.C. Power Source — The Receiver will be inoperative, although the tubes and pilot lamp will light.

   b. A.C. Power Source — A hum may be heard in the output of the Receiver.

   Proper polarization of the plug will eliminate the possibility of shock occurring in installations where one side of the power line is grounded, if the operator should make bodily contact between the Receiver and ground.

4. Adjust controls as recommended in Section 2 for the reception of signals.

1-2. ANTENNA RECOMMENDATIONS

The antenna input circuit of the SW-54 is arranged for operation from either a single-wire type, doublet type or other types of antennas having impedances of 70 ohms or more. The input impedance of the antenna circuit is approximately 300 ohms.

The most practical antenna for use in installations where the Receiver is to be used over a wide range of frequencies is the single-wire type. An antenna length of from 50 to 75 feet is recommended although the length is not critical and any length from 15 to 75 feet may be used. The receiver is provided with a single-wire type antenna 15 feet long. If erection of a longer antenna is not practical this antenna will result in satisfactory reception if extended for its full length. If the Receiver is to be operated on one frequency or a narrow band of frequencies, best results will be obtained by the use of a tuned antenna, such as a folded doublet or half-wave dipole type, designed for the operating frequency.

The methods of connecting the various types of antennas to the antenna terminal strip at the rear of the Receiver are as follows:

1. Single-wire type — Connect the antenna to terminal A at the left of the strip and connect the metal link to the unused A terminal.

2. Doublet-type — Connect the antenna feeders to the two terminals marked A; the metal link is not used.

3. Concentric transmission line type — Connect the inner conductor to terminal A at the left of the strip and the outer conductor to the other A terminal. Connect the metal link to the center A terminal.

SECTION 2. OPERATION

2-1. GENERAL DESCRIPTION

The SW-54 is an A.C./D.C. superheterodyne Receiver having a complement of four tubes plus a rectifier with a continuous frequency range of from 540 kilocycles to 30 megacycles. The Receiver is designed to provide reception of amplitude modulated voice or music and code telegraphy signals throughout its entire frequency range.

A stage outline of the circuit employed in the Receiver is given below together with the tube type associated with each stage.

Converter	12BE6
C.W. Osc. — I.F. Amplifier (455 Kc.)	12BA6
Second Det. - A.V.C. - First Audio	12AV6
Audio Output	50C5
Rectifier	35Z5

Two audio output circuits are provided in the SW-54:

1. The built-in loudspeaker is a permanent magnet type.
2. Phone tip jacks are mounted at the rear of the receiver to accommodate headphones. The headphones load impedance is not critical, permitting the use of various types of headphones including crystal types.

2-2. TUNING SYSTEM

The two-gang main tuning capacitor and four set of coils are used to cover the frequency range of the SW-54 in four tuning bands as shown on the following table. A bandspread tuning dial scale calibrated from 0 to 100 is provided to permit bandspread tuning of any portion of the frequency range of the receiver.

BAND	FREQUENCY COVERAGE
A	.54 to 1.6 mc.
B	1.6 to 4.7 mc.
C	4.6 to 14.5 mc.
D	12 to 30 mc.

The main dial has four scales accurately calibrated directly in megacycles. The respective scales are marked with heavy black scorings to clearly locate for the operator such short-wave features as the Amateur, Police, Foreign Broadcast and Ship bands. These locating markers are identified by letters AM, P, F and S respectively.

2-3. OPERATING INSTRUCTIONS

After the SW-54 has been installed as outlined in Section 1, it is placed in operation for voice

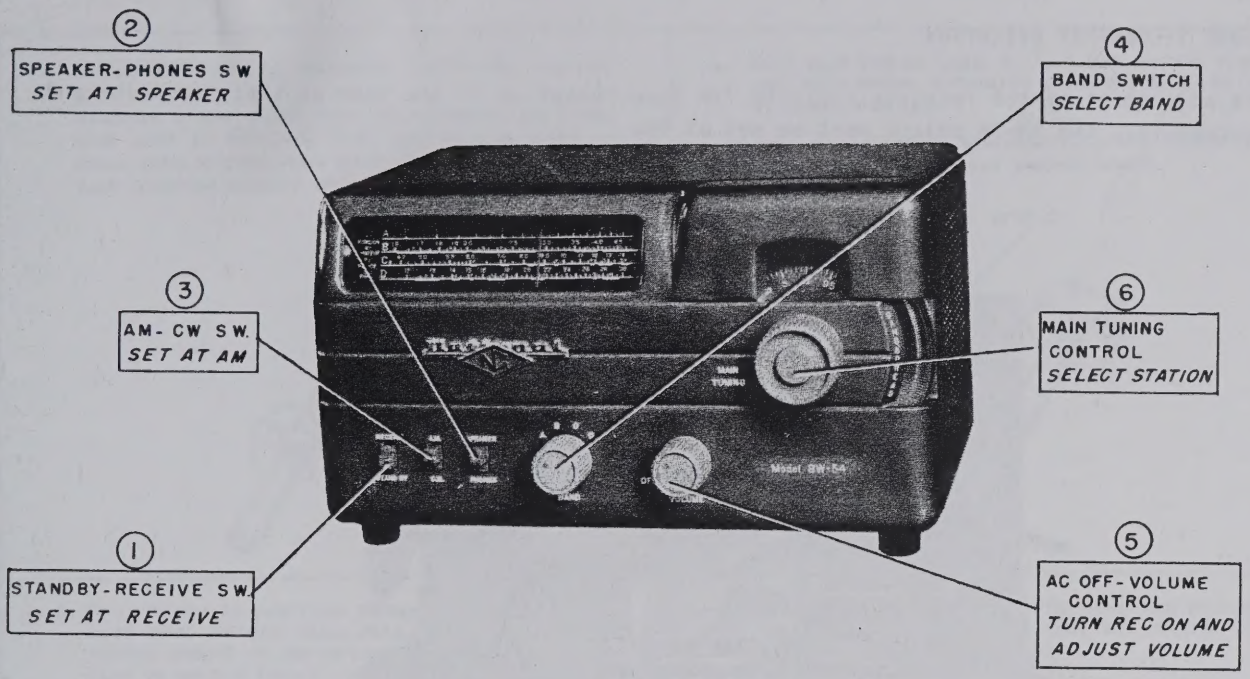

Figure No. 1. Simplified Operating Instructions

or music reception by adjustment of the receiver controls. Figure No. 1 gives the step-by-step procedure to follow for the reception of signals. The same procedure is outlined below with a brief description of the function of each control.

1. Set the Standby-Receive switch at Receive. This switch, in the Standby position is used to quiet the Receiver for a period of time such as during a transmitting period, when it is desirable to resume reception immediately without waiting for the tubes to warm up.

2. Set the Speaker-Phones switch at Speaker. Should headphone operation be desired set the switch at Phones and connect headphones to the Phones jack located at the rear of the receiver.

3. Set the AM-CW switch at AM.

4. Set the Band switch at the band of frequencies to be tuned. The four positions of the Band switch select the proper set of coils to cover the frequency range of the four tuning bands of the SW-54. Each position is marked with a band letter designation which corresponds to the markings appearing on the main dial.

5. Turn the Volume control from the A.C. off position to the point providing the desired audio volume. In the A.C. Off position the SW-54 is turned off: advancing the control knob in a clockwise direction turns on the Receiver and increases the audio output volume to a maximum at the extreme clockwise position.

6. Set the main tuning dial pointer at the desired frequency. The main tuning control knob and dial scale are used to tune the entire frequency range of the Receiver and tunes at any one time the band of frequencies selected by the Band switch.

7. To utilize the advantages of bandspread (fine) tuning and logging provided by the SW-54 proceed as follows:

(a) Set the main tuning dial pointer at the Low frequency limit of the band of frequencies to be tuned.

(b) Hold the main tuning control knob (or the outer edge of the Bandspread dial) firmly enough to prevent the main tuning dial pointer from moving and set the bandspread dial at Zero by rotating the inner segment of the Bandspread dial.

(c) Bandspread tuning can now be accomplished by rotation of the entire Bandspread dial in a clockwise direction. Logging of stations is accomplished by noting the frequency setting of the main dial pointer and the numerical setting of the bandspread dial.

2-4. CODE TELEGRAPHY RECEPTION

The adjustment of the receiver controls for code reception is the same as that for voice and music except that the AM-CW switch must be set at CW.

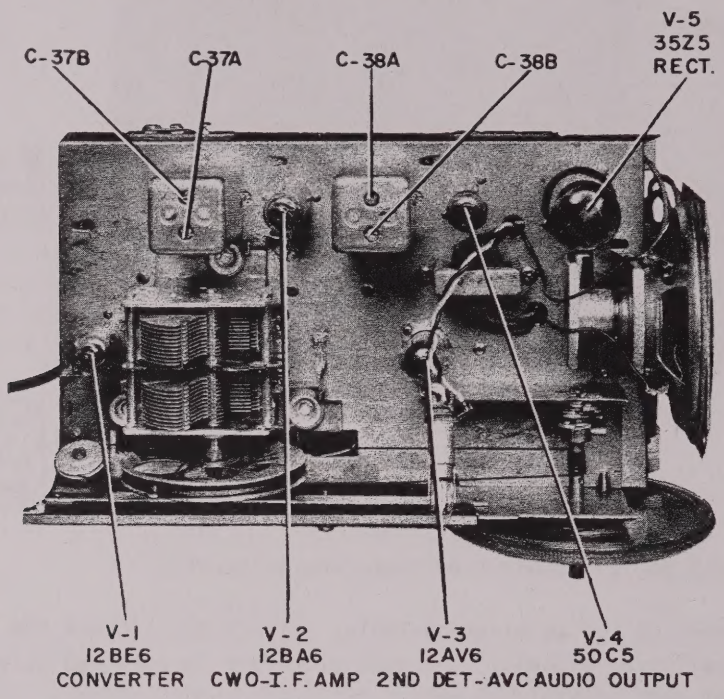

Figure No. 2. Tube and Alignment Adjustment Locations

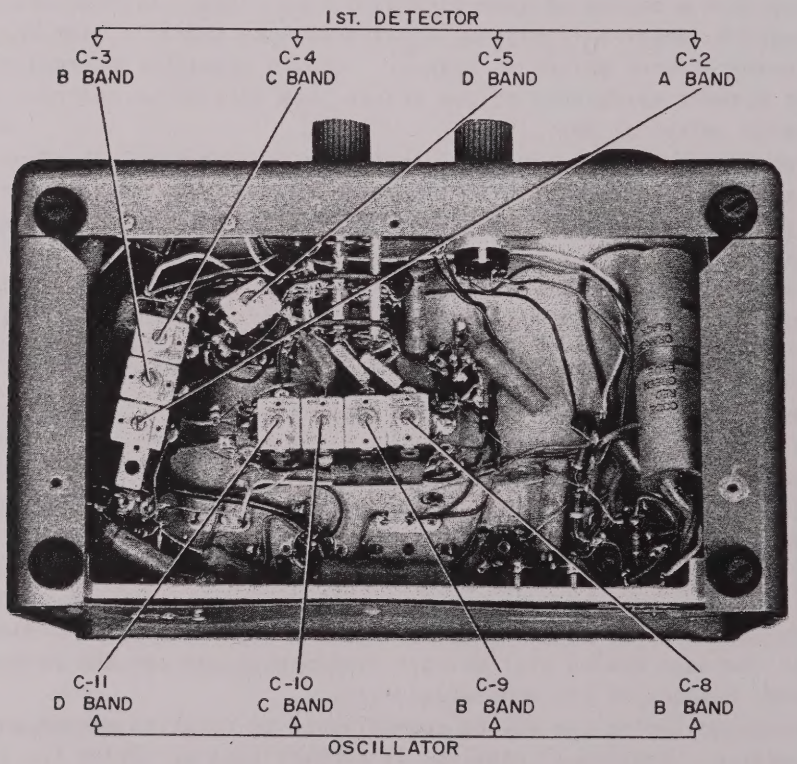

Figure No. 3. R.F. Alignment Trimmer Locations

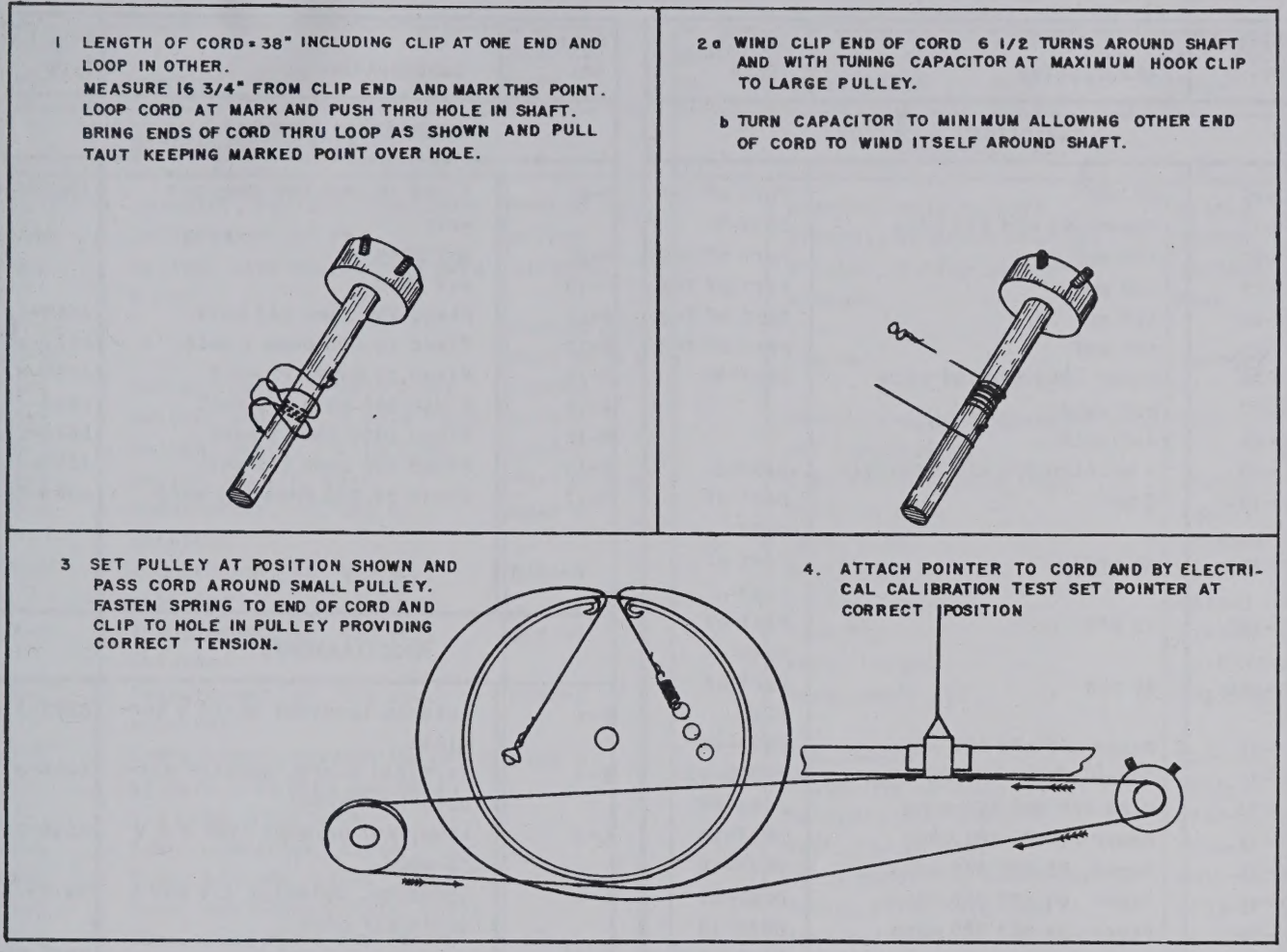
1 LENGTH OF CORD = 38" INCLUDING CLIP AT ONE END AND LOOP IN OTHER.
MEASURE 16 3/4" FROM CLIP END AND MARK THIS POINT.
LOOP CORD AT MARK AND PUSH THRU HOLE IN SHAFT.
BRING ENDS OF CORD THRU LOOP AS SHOWN AND PULL TAUT KEEPING MARKED POINT OVER HOLE.
2 a WIND CLIP END OF CORD 6 1/2 TURNS AROUND SHAFT AND WITH TUNING CAPACITOR AT MAXIMUM HOOK CLIP TO LARGE PULLEY.
b TURN CAPACITOR TO MINIMUM ALLOWING OTHER END OF CORD TO WIND ITSELF AROUND SHAFT.
3 SET PULLEY AT POSITION SHOWN AND PASS CORD AROUND SMALL PULLEY. FASTEN SPRING TO END OF CORD AND CLIP TO HOLE IN PULLEY PROVIDING CORRECT TENSION.
4. ATTACH POINTER TO CORD AND BY ELECTRICAL CALIBRATION TEST SET POINTER AT CORRECT POSITION

Figure No. 4. Dial Stringing Instructions

PARTS LIST

Symbol No.	Description	Nat. Co. Type
	CAPACITORS	
C-1	Paper .01 mfd 400 vdcw	D827-5
C-2	Variable mica 2.2-40 mmf 500 vdcw	D832-5
C-3	Variable mica 2.2-40 mmf	D832-5
C-4	Variable mica 2.2-40 mmf	D832-5
C-5	Variable mica 2.2-40 mmf	D832-5
C-6	Paper .02 mfd 200 vdcw	D827-51
C-7	Ceramic 10 mmf 500 vdcw	D825D-426
C-8	Variable mica 2.2-40 mmf	D832-5
C-9	Variable mica 2.2-40 mmf	D832-5
C-10	Variable mica 2.2-40 mmf	D832-5
C-11	Variable mica 2.2-40 mmf	D832-5

Symbol No.	Description	Nat. Co. Type
	CAPACITORS (CONT'D)	
C-12	Mica 470 mmf 500 vdcw	J665-55
C-13	Mica 1000 mmf 300 vdcw	J665-70
C-14	Mica 3000 mmf 500 vdcw	J666-30
C-15	Ceramic 21 mmf 500 vdcw	D825D-410
C-16	2 section variable	K577-3
C-16A	12 to 441.7 mmf	Part of C-16
C-16B	12 to 441.7 mmf	Part of C-16
C-17	Ceramic 3 mmf	J695-4
C-18	Ceramic 100 mmf	J695-6
C-19	87 mmf	Part of T-1

Symbol No.	Description	Nat Co. Type
	CAPACITORS (CONT'D)	
C-20	87 mmf	Part of T-1
C-21	Paper .01 mfd 400 vdcw	D827-5
C-22	110 mmf	Part of T-2
C-23	110 mmf	Part of T-2
C-24	100 mmf	Part of T-2
C-25	100 mmf	Part of T-2
C-26	Paper .005 mfd 200 vdcw	D827-50
C-27	Not Used	
C-28	Not Used	
C-29	4 section dry electrolytic	Q252-1
C-29A	5 mfd	Part of C-29
C-29B	40 mfd	Part of C-29
C-29C	40 mfd	Part of C-29
C-29D	60 mfd	Part of C-29
C-30	Paper .02 mfd 600 vdcw	D827-44
C-31	Ceramic 100 mmf 500 vdcw	D825D-421
C-32	Mica 470 mmf 500 vdcw	J665-56
C-33	Paper .1 mfd 400 vdcw	D827-12
C-34	Paper .02 mfd 600 vdcw	D827-44
C-35	Paper .02 mfd 200 vdcw	D827-51
C-36	Paper .25 mfd 200 vdcw	D827-15
C-37	Variable ceramic 2 section	Part of T-1*
C-37A	35-150 mmf	Part of C-37
C-37B	35-150 mmf	Part of C-37
C-38	Variable ceramic 2 section	Part of T-2*
C-38A	35-150 mmf	Part of C-38
C-38B	35-150 mmf	Part of C-38
C-39	Paper .002 mfd 600 vdcw	D827-6
C-40	Paper .002 mfd 600 vdcw	D827-6
	RESISTORS	
R-1	Fixed 470,000 ohms 1/2 watt	J569-57
R-2	Fixed 47 ohms 1/2 watt	J569-9
R-3	Fixed 47 ohms 1/2 watt	J569-9
R-4	Fixed 150 ohms 1/2 watt	J569-15
R-5	Fixed 47,000 ohms 1/2 watt	Part of T2
R-6	Variable 500,000 ohms w/switch	K347-6
R-7	Fixed 2,200,000 ohms 1/2 watt	J569-65

*Alternate IF Trans.

Symbol No.	Description	Nat. Co Type
	RESISTORS (CONT'D)	
R-8	Fixed 10,000,000 ohms 1/2 watt	J569-73
R-9	Not Used	
R-10	Not Used	
R-11	Fixed 150 ohms 1/2 watt	J569-15
R-12	Fixed 15,000 ohms 1 watt	J571-39
R-13	Fixed 22 ohms 1/2 watt	J569-5
R-14	Fixed 560 ohms 1/2 watt	J569-22
R-15	Fixed 1000 ohms 1 watt	J571-25
R-16	Fixed 330 ohms 1/2 watt	J569-19
R-17	Fixed 22,000 ohms 1/2 watt	J569-41
	MISCELLANEOUS	
E-1	Antenna terminal board 3 terminal	E261-3
E-2	Terminal board, speaker output, 2 terminal	E264-1
L-1	Lamp, #47 bayonet type 6-8 v .15 amps	F136-11
L-1	Inductor, detector A, B and C coils air core	SA:7973
L-1A		Part of L-1
L-1B		Part of L-1
L-1C		Part of L-1
L-2	Inductor, detector "D" coil air core	SA:7971
L-3	Inductor, oscillator "A", "B", "C" and "D" coils air core	SA:7981
L-3A		Part of L-3
L-3B		Part of L-3
L-3C		Part of L-3
L-3D		Part of L-3
L-9	Inductor, variable, iron core Tuning	Part of T-1
L-10	Inductor, variable, iron core tuning	Part of T-1
L-11	Inductor, variable iron core tuning	Part of T-2

Symbol No.	Description	Nat. Co. Type
	MISCELLANEOUS (CONT'D)	
L-12	Inductor, variable iron core	Part of T-2
LS-1	Loudspeaker, 4" PM	Q374-1
S-1	Switch, band selector, 2 pole 4 pos	SA:9307
S-1A		Part of S-1
S-1B		Part of S-1
S-2	Switch, CW-AM, 1 pole 2 pos	L209-2
S-3	Switch, standby, 1 pole 2 pos	L209-2
S-4	Switch, phone, 1 pole 2 pos	L209-2
S-5	Switch, on off, spst	Part of R-6
T-1	Transformer, IF, 455 Kc., shielded	Q242-2
T-1*	Transformer, IF, 455 Kc., shielded	Q243-1
T-2	Transformer, IF, 455 Kc., shielded	Q242-1
T-2*	Transformer, IF, 455 Kc., shielded	Q243-2
T-3	Transformer: speaker matching, primary 2500 ohms secondary 3.2 ohms, iron core	Q238-1
V-1	Tube, converter, 12BE6	
V-2	Tube, pentode, 12BA6	
V-3	Tube, duo diode triode, 12AV6	
V-4	Tube, beam power amplifier, 50C5	
V-5	Tube, full wave rectifier, 35Z5	
Z-1	Filter, one 47,000 ohm resistor and two 100 mmf. capacitors	Q262-1
Z-2	Filter, one 250,000 ohm and one 500,000 ohm resistor; one 5000 and two 250 mmf capacitors	R983-1
	*Alternate IF Trans.	

Symbol No.	Description	Nat. Co. Type
	MECHANICAL PARTS	
	Bracket, main support	Q228-2
	Bracket, to mount coil (2)	Q249-1
	Bracket, pulley support	SA:7969
	Antenna	R914
	Cabinet	SA:9303
	Chassis, metal wraparound less all components	Q227-2
	Clip for miniature tube	K925-1
	Cord, AC Line	L284-1
	Cord, dial	SA:9465
	Back, cabinet	R057-1
	Bottom , cabinet	R074-1
	Foot (4)	E293-4
	Knob, large	SA:5292-2
	Knob, small (2)	SA:9305
	Pad, rubber	Q254-2
	Plate, for switch	Q235-1
	Pointer, dial scale	Q240-1
	Rail, for pointer	Q234-1
	ing, retaining (dial shaft)	K416-6
	Scale, slide rule type	Q233-1
	Dial and shaft	SA:9302
	Shield, for miniature tube	K924-1
	Socket, for dial light	J721-2
	Socket, miniature 7 pin (4)	K926-2
	Socket, octal type	Q236-1
	Strap, for speaker mounting	Q253-1
	Window for the slide rule scale	Q225-2

Standard Form Warranty

Adopted by the Radio Manufacturers Association, Inc.

This equipment is warranted to be free from defective material and workmanship and repair or replacement will be made of any part which under normal installation, use and service discloses defect, provided the unit is delivered by the owner to the manufacturer or through the authorized radio dealer or wholesaler from whom purchased, intact, for examination, with all transportation charges prepaid to the factory, within ninety days from the date of original shipment from the factory, and provided that such examination discloses in the manufacturer's judgment that it is thus defective.

This warranty does not extend to any radio products which have been subjected to misuse, neglect, accident, incorrect wiring, improper installation, or to use in violation of instructions furnished by the manufacturer, nor extend to units which have been repaired or altered outside of the factory, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith of other manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for the manufacturer any other liability in connection with the sale of their radio products.

National Company, Inc. reserves the right to make any change in design or to make addition to, or improvements in, its products without imposing any obligations upon itself to install them in its products previously manufactured.

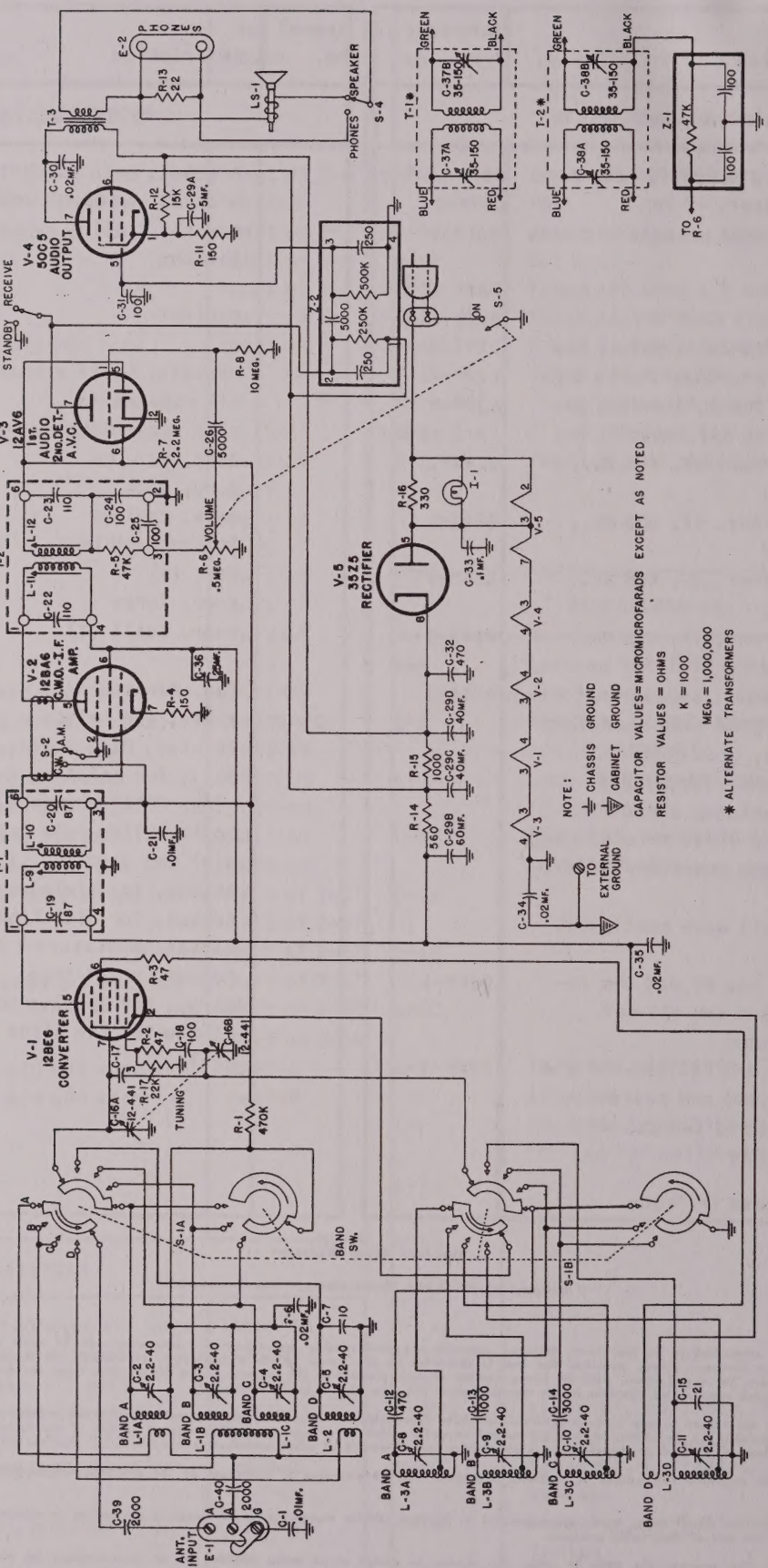

Figure No. 5. Schematic Diagram, SW-54 Receiver

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